

REMARKS

The Examiner has rejected claims 1 and 4-8 under 35 U.S.C. § 103(a) as being unpatentable by Wang et al. U.S. Patent Application Publication No. 2002/0173127 in view of Cui et al. U.S. Patent Application Publication No. 2002/0151186. Claims 1 and 4-8 are also rejected under § 103(a) as being unpatentable over Fong et al. U.S. Patent No. 5,812,403 in view of Wang et al. The following remarks are respectfully submitted.

With respect to the rejection over Wang et al. in view of Cui et al., Applicants respectfully traverse. Examiner asserts that “Wang et al. teaches a method ... comprising: determining a threshold value of an optical emission intensity or [sic] the ceramic heater, ... comparing the measured value to the threshold value to determine coating status of the ceramic substrate heater ... stopping the process when the measured value is approximately equal to the threshold value” Examiner’s assertion is a misstatement of the teachings of the primary reference, such that the alleged *prima facie* case obviousness over the combination of Wang et al. and Cui et al. is flawed. First, Wang et al. does not, as Examiner asserts, teach the step of determining a threshold value of optical emission intensity for the ceramic heater. Second, Wang et al. does not, as Examiner asserts, teach the step of comparing the measured value from the optical pyrometer to a threshold value. Finally, Wang et al. does not, as Examiner asserts, teach the step of stopping the process when a measure value is approximately equal to a threshold value. Examiner asserts that Wang et al. uses the optical measurement to determine film thickness, and this is simply not accurate.

In discussing the prior art measurement technique in the Background, Wang et al. disclose that radiantly-heated film deposition chambers are particularly sensitive to temperature fluctuations, which fluctuations result in non-uniform thickness for the deposited film (see paragraphs [0007] and [0009]). In the radiantly-heated reactor, temperature is measured optically with a pyrometer typically located below the chamber by measuring the optical intensity emitted by the heated susceptor (see paragraphs [0005]). Since emitted radiation is dependent on susceptor temperature, the measured intensity can then be used to calculate the susceptor temperature and thereby indirectly monitor the susceptor and wafer temperature for those

unwanted fluctuations. But, that measured intensity or emissivity of the susceptor is dependent on surface condition of both the susceptor and the chamber wall, such that residue accumulated on those surfaces can cause an inaccuracy of the indirect temperature measurement. Therefore, to ensure that the measurement is accurate, periodic chamber cleaning would be needed. To address the problems with the inaccuracy of the indirect temperature measurement/monitoring technique of the prior art using a pyrometer in a radiantly-heated reactor, Wang et al. disclose use of a resistively-heated reactor having a thermocouple physically coupled to a resistive heater in the susceptor to measure and monitor the temperature directly. This resistive heating and direct physical measurement allows for precise temperature control, to thereby provide uniform deposited film thickness. In neither the Background discussion of the pyrometer measurement technique nor the Detailed Description discussion of the thermocouple measurement technique do Wang et al. disclose the use of these measurement techniques for determining coating status of the susceptor or the determination of a threshold intensity value to which the measured intensity value is compared to determine that status. Because Examiner has mischaracterized the teachings of the primary reference and because the primary reference does not, in fact, teach the elements asserted by Examiner, the rejection cannot stand. In making this argument, Applicant is not merely attacking a reference individually where the rejection is based on a combination, but rather, Applicant is pointing out the mischaracterization of the teachings of a reference used by the Examiner in support of the rejection over the combination of references.

The elements of the claimed invention that Examiner asserts are taught or suggested by Wang et al., which are not in fact taught or suggested by Wang et al., are also not taught or suggested by Cui et al., such that the elements are not taught or suggested by the combination of references. First, Cui et al. does not teach or suggest the step of determining a threshold value of optical emission intensity for the ceramic heater, which element is also not taught or suggested by Wang et al. Second, Cui et al. does not teach or suggest the step of comparing the measured value from the optical pyrometer to a threshold value, which element is also not taught or suggested by Wang et al. Finally, Cui et al. does not teach or suggest the step of stopping the process when a measured value is approximately equal to a threshold value. In

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Cui et al., the temperature of the cleaning gas is monitored, and the end-point of the cleaning process is indicated when the temperature of the cleaning gas reaches a steady state, not a threshold value. This teaching, in combination with Wang et al., does not amount to a teaching or suggestion of monitoring optical emissions radiating from a coated ceramic substrate heater as the coating is being removed, as set forth in claims 1 and 8, to determine the status of that coating. It also does not amount to a teaching or suggestion of measuring a threshold value of optical emission radiating from an uncoated ceramic substrate heater, then comparing the measured value radiating from the coated ceramic substrate heater to the threshold value, and stopping the process when the measured value approximately equals the threshold value. Therefore, it is asserted that there is no *prima facie* case of obviousness over Wang et al. in view of Cui et al., and it is respectfully requested that the rejection be withdrawn.

With respect to the rejection over Fong et al. in view of Wang et al., Applicants respectfully traverse. Examiner admits that Fong et al. do not explicitly teach monitoring optical emission radiating directly from the heater. Examiner then asserts that Wang et al. teaches determining process end points by measuring radiation directly emitted by a heater in paragraph 0005 such that substituting the measuring of reaction products in Fong et al. with the IR radiation measurement of Wang et al. would have been obvious. Examiner's assertion, however, is flawed because Examiner mischaracterizes the relevant teaching of Wang et al., such that the resulting combination of Wang et al. with Fong et al. is not accurately characterized by Examiner. Again, in making this argument, Applicant is not merely attacking a reference individually where the rejection is based on a combination, but rather, Applicant is pointing out the mischaracterization of the teachings of a reference used by the Examiner in support of the rejection over the combination of references. Wang et al. do not teach determining end points as Examiner asserts. This is a mischaracterization of the teachings of the secondary reference. As explained above, Wang et al. merely disclose measuring the optical intensity emitted by the susceptor to indirectly measure wafer temperature, and recognize that residue on the susceptor surface will affect the accuracy of that measurement, such that the chamber needs periodic cleaning to remove residue to ensure accurate wafer temperature measurement using the optical measurement technique.

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There is simply no end-point detection technique disclosed in Wang et al. Wang et al. merely teaches that non-uniform temperatures may result in non-uniform film thickness in a deposition process, such that accurate measurement and monitoring of temperature uniformity is needed. Wang et al. therefore does not teach or suggest modifying Fong et al. to monitor optical emissions radiating from a coated heater to determine the status of the coating during a cleaning process to remove the coating so as to determine when to stop the cleaning process. Therefore, it is asserted that there is no *prima facie* case of obviousness over Fong et al. in view of Wang et al., and it is respectfully requested that the rejection be withdrawn.

In view of the remarks given herein, Applicants respectfully believe this case is in condition for allowance and respectfully request allowance of the pending claims. If the Examiner believes any detailed language of the claims requires further discussion, the Examiner is respectfully asked to telephone the undersigned attorney so that the matter may be promptly resolved. The Examiner's prompt attention to this matter is appreciated.

Applicants are of the opinion that no additional fee is due as a result of this Amendment. If any charges or credits are necessary to complete this communication, please apply them to Deposit Account No. 23-3000.

Respectfully submitted,
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